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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/826,240
Filing Date: April 04, 2001
Appellant(s): KAVIPURAPU, ANIL

J. Joel Justiss
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 04/07/06 appealing from the Office action mailed 11/02/05.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,719,800	MITTAL ET AL.	2-1998

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 21-25 and 28-32 are rejected under 35 U.S.C. 102(b) as being anticipated by Mittal et al., US Patent no. 5,719,800 [Mittal].

Regarding claim 21, Mittal discloses a power selection system for use with a reconfigurable circuit [microprocessor, column 2, lines 14-19], comprising:

a monitoring circuit [activity monitor] configured to determine a transition rate of at least one node [functional unit] located within said reconfigurable circuit [column 5, lines 18-25]; and

a mode selection circuit [mode controller] coupled to said monitoring circuit and configured to reconfigure said reconfigurable circuit by altering a power characteristic applied to at least a portion of said reconfigurable circuit based on a comparison between said transition rate and a predetermined operating range [column 5, lines 22-30].

Regarding claim 22, Mittal further discloses a switching counter to determine the transition rate [counter, column 6, lines 13-16].

Regarding claim 23, Mittal further discloses reducing power to the functional unit [column 5, lines 25-30].

Regarding claim 24, Mittal further discloses at least one edge detection circuit configured to determine a voltage change in said at least one node and said transition rate is based on said voltage change [counter increments when activity is detected, column 6, lines 13-19].

Regarding claim 25, Mittal further discloses using timer to employ a time period for determining a transition rate [inherent since some type of timer must be used in determining a rate of activity].

Regarding claim 28, Mittal discloses a method of operating a reconfigurable circuit comprising:

determining a transition rate of at least one node [functional unit] located within said reconfigurable circuit [column 5, lines 18-25]; and

reconfiguring said reconfigurable circuit by altering a power characteristic applied to at least a portion thereof circuit based on a comparison between said transition rate and a predetermined operating range [column 5, lines 22-30].

Regarding claim 29, Mittal further discloses aggregating a number of switching transitions associated with said node [column 6, lines 13-16].

Regarding claim 30, Mittal further discloses reducing power to the functional unit [column 5, lines 25-30].

Regarding claim 31, Mittal further discloses that the determination of the transition rate is based on a voltage change in said at least one node and said transition rate is based on said voltage change [counter increments when activity is detected, column 6, lines 13-19].

Regarding claim 32, Mittal further discloses using an interrupt timer to employ a time period for determining a transition rate [inherent since some type of timer must be used in determining a rate of activity].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 26, 27 and 33-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mittal et al., US Patent no. 5,719,800 [Mittal].

Regarding claim 26 and 33, Mittal, as described above, discloses a power selection system for use with a reconfigurable circuit. Mittal does not specifically disclose using a sample and hold circuit and two comparators for determining whether a count value is within a range. However, sample and hold circuit and comparators systems are notoriously well known in the art to be used to determining whether a count value is within a range. It would have been obvious to one of ordinary skill in the art to include the well known sample and hold circuit and comparators system in order to determine whether the CAS* value is in a certain range.

Regarding claim 27, Mittal, as described above, discloses a power selection system for use with a reconfigurable circuit. Mittal does not disclose that the reconfigurable circuit that comprises a PRBS generator. However, reconfigurable PRBS generators are well known in the art. It would have been obvious to one of ordinary skill in the art to apply the power selecting method taught by Mittal to well known reconfigurable PRBS generators in order to reduce their power consumption.

Regarding claims 34-40, Mittal, as described above, discloses a power selection system for use with a reconfigurable circuit. Mittal does not disclose that the reconfigurable circuit

comprises a monitored circuit with a delay element and a multiplier, such as a PRBS generator or a digital filter. However, reconfigurable PRBS generators and digital filters are well known in the art. It would have been obvious to one of ordinary skill in the art to apply the power selecting method taught by Mittal to well known reconfigurable PRBS generators and digital filters in order to reduce their power consumption.

(10) Response to Argument

1. Appellant argues in substance, with regard to claims 21 and 28, that Mittal does not teach reconfiguring a reconfigurable circuit. The examiner disagrees.

The Appellant defines "reconfiguring a reconfigurable circuit" in the claims as "altering a power characteristic applied to at least a portion thereof." The examiner interprets the microprocessor in Mittal to be a "reconfigurable circuit" [column 2, lines 14-19] and the functional unit in Mittal to be a "node" located within the processor and, consequently, is "at least a portion" of the microprocessor [column 2, lines 14-19]. The examiner interprets switching the functional unit between a normal mode of operation and a reduced-power mode in Mittal as "altering a power characteristic" of the functional unit [column 5, lines 25-30]. Since Mittal teaches, "altering a power characteristic applied to at least a portion" of a microprocessor, Mittal, by definition, teaches, "reconfiguring" the microprocessor. Therefore, Mittal does teach reconfiguring a reconfigurable circuit.

2. Appellant argues in substance, with regard to claim 22, that Mittal does not teach a switching counter configured to determine the transition rate of a monitored functional unit. The examiner disagrees.

Mittal teaches a switching counter [up/down counter] configured to determine the transition rate [current utilization] of a monitored functional unit [column 6, lines 13-26].

3. Appellant argues in substance, with regard to claims 23 and 30, that Mittal does not teach altering a power characteristic by removing power to at least a portion of the reconfigurable circuit. The examiner disagrees.

Mittal, as described in the above arguments regarding claims 21 and 28, teaches altering a power characteristic applied to at least a portion [switching a functional unit between a normal mode of operation and a reduced-power mode] of a reconfigurable circuit [microprocessor, column 2, lines 14-19 and column 5, lines 25-30]. When switching a functional unit from a normal mode of operation to a reduced-power mode of operation, at least some power is inherently removed from the functional unit. Therefore Mittal does teach altering a power characteristic by removing power to at least a portion of the reconfigurable circuit.

4. Appellant argues in substance, with regard to claim 24, that Mittal does not teach at least one edge detection circuit configured to determine a voltage change in the at least one node and that the transition rate is based on the voltage change. The examiner disagrees.

Mittal, as described in the above arguments regarding claim 22, teaches a switching counter [up/down counter] configured to determine the transition rate [current utilization] of a monitored functional unit [column 6, lines 13-26]. Mittal further teaches that the counter is incremented for each cycle that a functional unit is determined to be active [column 6, lines 13-19]. A digital circuit is considered active when the voltage level of at least one signal associated with the circuit changes over a period of time. A digital circuit is considered to be inactive when the voltage level of at least one signal associated with the circuit stays constant over a period of

time. Everytime a signal level changes from a first level to a second level an edge occurs. In order to detect a voltage level change, some sort of edge detection circuitry must be used to detect voltage level changes in the signals associated with the functional unit. Therefore, Mittal does teach at least one edge detection circuit configured to determine a voltage change in the at least one node and that the transition rate is based on the voltage change.

5. Appellant argues in substance, with regard to claim 25, that Mittal does not teach a timing counter configured to track a period of operation of a reconfigurable circuit and a switching counter configured to employ the period of operation to determine a transition rate. It appears that the Appellant argues that Mittal cannot teach a timing counter configured to track a period of operation of a reconfigurable circuit and a switching counter configured to employ the period of operation to determine a transition rate because Mittal does not teach determining a transition rate of at least a node. The examiner disagrees.

Mittal, as described in the above arguments regarding claim 22, does teach a switching counter [up/down counter] configured to determine the transition rate [current utilization] of a monitored node [functional unit, column 6, lines 13-26]. Mittal further teaches that the value of the counter is compared to a threshold value to determine whether a functional unit is to be placed in a normal power mode or a reduced-power mode [column 5, lines 44-54]. The value of the counter changes according to the activity level of the functional unit for a period of time [column 6, lines 19-26]. Some sort of timing counter must be used to keep track of the period of time. Therefore, Mittal does teach a timing counter configured to track a period of operation of a reconfigurable circuit and a switching counter configured to employ the period of operation to determine a transition rate.

6. Appellant argues in substance, with regard to claim 29, that Mittal does not teach aggregating a number of switching transitions associated with a node. It appears that the Appellant argues that Mittal cannot teach aggregating a number of switching transitions associated with a node because Mittal does not teach determining a number of switching transitions associated with a node. The examiner disagrees.

Mittal teaches a switching counter [up/down counter] configured to determine the transition rate [current utilization] of a monitored node [functional unit] by incrementing when the node is active [column 6, lines 13-26]. As described in the above arguments regarding claim 24, a digital circuit is considered active when the voltage level of at least one signal associated with the circuit changes over a period of time. A digital circuit is considered to be inactive when the voltage level of at least one signal associated with the circuit stays constant over a period of time. Mittal teaches that the counter is incremented for each cycle that a functional unit is determined to be active [column 6, lines 13-19]. Consequently, Mittal teaches that the counter is incremented when the voltage level of at least one signal associated with the functional unit transitions from a first level to a second level in a period of time. Therefore, Mittal teaches aggregating a number of switching transitions associated with a node.

7. Appellant argues in substance, with regard to claim 31, that Mittal does not teach determining a transition rate of a node based on a number of voltage changes in the at least one node. It appears that the Appellant argues that Mittal cannot teach determining a transition rate of a node based on a number of voltage changes in the at least one node because Mittal does not teach determining a transition rate of a node. The examiner disagrees.

Mittal, as described in the above arguments regarding claim 22, does teach a switching counter [up/down counter] configured to determine the transition rate [current utilization] of a monitored node [functional unit, column 6, lines 13-26]. As described in the above arguments regarding claim 24, a digital circuit is considered active when the voltage level of at least one signal associated with the circuit changes over a period of time. A digital circuit is considered to be inactive when the voltage level of at least one signal associated with the circuit stays constant over a period of time. Mittal teaches that the counter is incremented for each cycle that a functional unit is determined to be active [column 6, lines 13-19]. Consequently, Mittal teaches that the counter is incremented when the voltage level of at least one signal associated with the functional unit changes from a first level to a second level in a period of time. Therefore, Mittal does teach determining a transition rate of a node based on a number of voltage changes in the at least one node.

8. Appellant argues in substance, with regard to claim 32, that Mittal does not teach tracking a period of operation of the reconfigurable circuit and employing the period of operation when determining the transition rate.

Mittal, as described in the above arguments regarding claim 22, does teach a switching counter [up/down counter] configured to determine the transition rate [current utilization] of a monitored node [functional unit, column 6, lines 13-26]. Mittal further teaches that the value of the counter is compared to a threshold value to determine whether a functional unit is to be placed in a normal power mode or a reduced-power mode [column 5, lines 44-54]. The value of the counter changes according to the activity level of the functional unit for a period of time [column 6, lines 19-26]. Some sort of timing counter must be used to keep track of the period of

time. Therefore, Mittal does teach tracking a period of operation of the reconfigurable circuit and employing the period of operation when determining the transition rate.

9. Appellant argues in substance, with regard to claim 34, that Mittal does not teach reconfiguring a reconfigurable circuit. The examiner disagrees.

As described in the arguments regarding claims 21 and 28, the Appellant defines "reconfiguring a reconfigurable circuit" in the claims as "altering a power characteristic applied to at least a portion thereof." The examiner interprets the microprocessor in Mittal to be a "reconfigurable circuit" [column 2, lines 14-19] and the functional unit in Mittal to be a "node" located within the processor and, consequently, is "at least a portion" of the microprocessor [column 2, lines 14-19]. The examiner interprets switching the functional unit between a normal mode of operation and a reduced-power mode in Mittal as "altering a power characteristic" of the functional unit [column 5, lines 25-30]. Since Mittal teaches, "altering a power characteristic applied to at least a portion" of a microprocessor, Mittal, by definition, teaches, "reconfiguring" the microprocessor. Therefore, Mittal does teach reconfiguring a reconfigurable circuit.

10. Appellant argues in substance, with regard to claims 26 and 39, that Mittal does not teach a mode selection circuit including a sample and hold circuit coupled to two voltage comparators.

The examiner agrees that Mittal does not teach a mode selection circuit including a sample and hold circuit coupled to two voltage comparators. Mittal teaches a mode selection circuit [mode controller, column 5, lines 22-30], but is silent as to how the mode selection circuit is implemented. However, Mittal is not relied upon to teach a mode selection circuit including a sample and hold circuit coupled to two voltage comparators. The examiner relies on the fact that sample and hold circuit and voltage comparator systems are well known systems in the art to be

used to determining whether a count value is within a range. It would have been obvious to one of ordinary skill in the art to use a well known sample and hold circuit and voltage comparator system as a way of implementing the mode selection circuit in the Mattel teachings. Appellant does not argue the fact that sample and hold circuit and voltage comparator systems are well known systems. Appellant only argues that Mittal does not teach a mode selection circuit including a sample and hold circuit coupled to two voltage comparators. Therefore, the combination of a well known sample and hold circuit and voltage comparator system with the Mittal teachings does render claims 26 and 29 obvious.

11. Appellant argues in substance, with regard to claim 27, that Mittal does not teach that the reconfigurable circuit is a Psuedo Random Binary Sequence (PRBS) generator.

The examiner agrees that Mittal does not teach that the reconfigurable circuit is a PRBS generator. However, Mittal is not relied upon to teach that the reconfigurable circuit is a PRBS generator. The examiner relies on the fact that PRBS generators are well known types of reconfigurable circuits. It would have been obvious to one of ordinary skill in the art to utilize the Mittal teachings in any reconfigurable circuit including well known PRBS generator circuits in order to reduce power consumption of the well known PRBS generator circuits. Appellant does not argue the fact that PRBS generator circuits are well known types of reconfigurable circuits. Appellant only argues that Mittal does not teach that the reconfigurable circuit is a PRBS generator. Therefore, the combination of the Mittal power saving teachings applied to a well known PRBS generator does render claim 27 obvious.

12. Appellant argues in substance, with regard to claim 33, that Mittal does not teach sampling and holding an analog representation of the transition rate and comparing a sample of the analog representation to the predetermined operating range.

The examiner agrees that Mittal does not teach sampling and holding an analog representation of the transition rate and comparing a sample of the analog representation to the predetermined operating range. Mittal teaches a mode selection circuit [mode controller] for selecting and operating mode based on a comparison between a transition rate value and a threshold value [column 5, lines 22-30], but is silent as to how the mode selection circuit is implemented. However, Mittal is not relied upon to sampling and holding an analog representation of the transition rate and comparing a sample of the analog representation to the predetermined operating range. The examiner relies on the fact that sample and hold circuitry and analog voltage comparator systems are well known systems in the art to be used to determining whether a count value is within a range. It would have been obvious to one of ordinary skill in the art to use a well known sample and hold circuit and analog voltage comparator system as a way of implementing the mode selection circuit in the Mattel teachings. Appellant does not argue the fact that sample and hold circuit and analog voltage comparator systems are well known systems. Appellant only argues that Mittal does not teach sampling and holding an analog representation of the transition rate and comparing a sample of the analog representation to the predetermined operating range. Therefore, the combination of a well known sample and hold circuit and analog voltage comparator system with the Mittal teachings does render claim 33 obvious.

13. Appellant argues in substance, with regard to claim 35, that Mittal does not teach a plurality of delay elements, associated with a respective node of the reconfigurable circuit, having a corresponding switch and a plurality of multipliers interposed between the one of the nodes and the output of the reconfigurable circuit.

The examiner agrees that Mittal does not teach a plurality of delay elements, associated with a respective node of the reconfigurable circuit, having a corresponding switch and a plurality of multipliers interposed between the one of the nodes and the output of the reconfigurable circuit. However, Mittal is not relied upon to teach a plurality of delay elements, associated with a respective node of the reconfigurable circuit, having a corresponding switch and a plurality of multipliers interposed between the one of the nodes and the output of the reconfigurable circuit. The examiner relies on the fact that a plurality of delay elements having a corresponding switch and a plurality of multipliers are commonly found in PRBS generators and digital filters, which are well known types of reconfigurable circuits. It would have been obvious to one of ordinary skill in the art to utilize the Mittal teachings in any reconfigurable circuit including well known PRBS generator and digital filter circuits in order to reduce power consumption of the well known PRBS generator and digital filter circuits. Appellant does not argue the fact that PRBS generator and digital filter circuits are well known types of reconfigurable circuits nor that a plurality of delay elements having a corresponding switch and a plurality of multipliers are commonly found in PRBS generators and digital filters. Appellant only argues that Mittal does not teach a plurality of delay elements having a corresponding switch and a plurality of multipliers. Therefore, the combination of the Mittal power saving

teachings applied to a well known PRBS generator or digital filter circuit does render claim 35 obvious.

14. Appellant argues in substance, with regard to claim 36, that Mittal does not teach that the transition rate is based on a total number of switching transitions associated with the switch within a period of operation of the reconfigurable circuit and that the monitoring circuit includes a switching counter that determines the total number of switching transitions. The examiner disagrees.

Mittal teaches a switching counter [up/down counter] configured to determine the transition rate [current utilization] of a monitored node [functional unit] by incrementing when the node is active [column 6, lines 13-26]. The value of the counter changes according to the activity level of the functional unit for a period of time [column 6, lines 19-26]. As described in the above arguments regarding claim 24, a digital circuit is considered active when the voltage level of at least one signal associated with the circuit changes over a period of time. A digital circuit is considered to be inactive when the voltage level of at least one signal associated with the circuit stays constant over a period of time. Mittal teaches that the counter is incremented for each cycle that a functional unit is determined to be active [column 6, lines 13-19]. Consequently, Mittal teaches that the counter is incremented when the voltage level of at least one signal associated with the functional unit transitions from a first level to a second level in a period of time. Therefore, Mittal teaches that the transition rate is based on a total number of switching transitions associated with the switch within a period of operation of the reconfigurable circuit and that the monitoring circuit includes a switching counter that determines the total number of switching transitions.

15. Appellant argues in substance, with regard to claim 37, that Mittal does not teach altering a power characteristic by removing power to at least a portion of the reconfigurable circuit. The examiner disagrees.

Mittal, as described in the above arguments regarding claims 21 and 28, teaches altering a power characteristic applied to at least a portion [switching a functional unit between a normal mode of operation and a reduced-power mode] of a reconfigurable circuit [microprocessor, column 2, lines 14-19 and column 5, lines 25-30]. When switching a functional unit from a normal mode of operation to a reduced-power mode of operation, at least some power is inherently removed from the functional unit. Therefore Mittal does teach altering a power characteristic by removing power to at least a portion of the reconfigurable circuit.

16. Appellant argues in substance, with regard to claim 38, that Mittal does not teach at least one edge detection circuit configured to determine a voltage change in the at least one node and that the transition rate is based on the voltage change. The examiner disagrees.

Mittal, as described in the above arguments regarding claim 22, teaches a switching counter [up/down counter] configured to determine the transition rate [current utilization] of a monitored functional unit [column 6, lines 13-26]. Mittal further teaches that the counter is incremented for each cycle that a functional unit is determined to be active [column 6, lines 13-19]. A digital circuit is considered active when the voltage level of at least one signal associated with the circuit changes over a period of time. A digital circuit is considered to be inactive when the voltage level of at least one signal associated with the circuit stays constant over a period of time. Everytime a signal level changes from a first level to a second level an edge occurs. In order to detect a voltage level change, some sort of edge detection circuitry must be used to

detect voltage level changes in the signals associated with the functional unit. Therefore, Mittal does teach at least one edge detection circuit configured to determine a voltage change in the at least one node and that the transition rate is based on the voltage change.

17. Appellant argues in substance, with regard to claim 40, that Mittal does not teach that the reconfigurable monitored sub-circuit is selected from the group consisting of a Psuedo Random Binary Sequence (PRBS) generator and a digital filter.

The examiner agrees that Mittal does not teach that the reconfigurable monitored sub-circuit selected from the group consisting of a PRBS generator and a digital filter. However, Mittal is not relied upon to teach that the reconfigurable monitored sub-circuit selected from the group consisting of a PRBS generator and a digital filter. The examiner relies on the fact that PRBS generators and digital filters are well known types of reconfigurable circuits. It would have been obvious to one of ordinary skill in the art to utilize the Mittal teachings in any reconfigurable circuit including well known PRBS generator and digital filter circuits in order to reduce power consumption of the well known PRBS generator and digital filter circuits. Appellant does not argue the fact that PRBS generator and digital filter circuits are well known types of reconfigurable circuits. Appellant only argues that Mittal does not teach that the reconfigurable circuit is selecting from the group consisting of a PRBS generator and a digital filter. Therefore, the combination of the Mittal power saving teachings applied to a well known PRBS generator or digital filter does render claim 40 obvious.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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